2003 ANNUAL REPORT

PARKER MOUNTAIN ADAPTIVE RESOURCE MANAGEMENT PLAN

Cooperators

Parker Mountain Grazing Association
U. S. Bureau of Land Management
U. S. Fish and Wildlife Service
U. S. Forest Service
U.S.D.A. Farm Services Agency
U.S.D.A. Natural Resource Conservation Agency
U.S.D.A. Wildlife Services
Utah Agricultural Experiment Station
Utah Department of Agriculture and Food
Utah Department of Natural Resources
Utah Division of Wildlife Resources
Utah Farm Bureau Federation
Utah School and Institutional Trustlands Administration
Utah State University Vice President for Research
Wayne and Piute County Commissions

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EXECUTIVE SUMMARY

The Parker Mountain Adaptive Resource Management Plan (PARM) Working Group began in 1998. PARM was organized to assist local communities in Wayne and Piute Counties to address sage-grouse conservation and local socio-economic issues. The group has focused its efforts on restoring rangeland vegetation diversity on Parker Mountain. PARM believes these efforts will benefit both local communities and Greater Sage-grouse populations. Currently, Greater Sage-grouse populations on Parker Mountain appear to be doing well. In 2002, the highest lek counts ever on Parker Mountain were recorded. In 2003 the count was down slightly from 2002. Many factors contribute to lek count data, and in 2003 males/lek were still relatively high compared to historical counts.

In 2003, the seasonal movements of 25 radio collared hens were monitored. Six of the hens suffered mortality prior to nesting. Eighteen of the 19 extant hens (95%) nested. The one non-nesting hen could not be located for a period of time during the nest initiation period, and may have initiated and lost her nest without our knowledge. Nest initiation took place throughout May. This is slightly later than the previous year. Weather was more severe during April and May, with a snow storm in late May on Parker Mountain.

Seven nests (39%) were predated in 2003. Nest abandonment was 11% (n=2). One abandoning event may have been caused by observer disturbance. This is similar to the last two years, but high relative to previous years. The clutch sizes ranged from four to eight eggs, with the majority being between five and six. Nest success (at least one egg hatched) in 2003 was 50%, and comparative to 2002 (58%) and 2001 (50%).

Brood-rearing activities began in late May and early June and continued through the summer. Two hens suffered mortality during brood-rearing activities. One of the two hens suffered mortality within two days after hatching. Another had at least four chicks

at 3 ½ weeks of age. All other broods survived to at least six weeks with at least one chick. Brooding success was relatively high compared to past years.

In 2003, hen movements from lek to nest sites to brood-rearing areas were fairly large-scale in comparison to 2002. Nesting frequently occurred relatively far away from leks as compared to 2002. Lek attendance was at lower elevation leks. This could be attributed to weather patterns, as there was more snow at higher elevation lek sites.

Experimental Treatments

In October 2000, four 100 acres plots were treated with tebuthiuron. The vegetation response of the sagebrush to tebuthiuron treatments was readily evident. Although, after vegetation measurements were made in 2001, there was no significant difference in vegetation cover detected between the treated and non-treated sites. Presumably, the exceptionally wet year and the delayed effects of tebuthiuron made it difficult to detect a measurable response. In 2002 (an exceptionally dry year) there was a significant forb response measured on the spike treatment plots. Given the extremely dry weather conditions in 2002, the response of the forbs was critical for broods in the area. The grasses declined in abundance on both the control and the treatment plots. In 2003, forb and grass response was significantly different than the control plots.

In 2003 bird dog flush counts and pellet counts were used to assess sage-grouse use within treatment plots. Spike treatments were shown to have the most sage-grouse use by both bird dog surveys and pellet counts. All three treatments showed higher use than the control in both surveys.

In 2002 the impact rabbits might be having on vegetation response in the study area became a concern. To monitor this effect on Parker Lake pasture, in 2002 additional rabbit-proof exclosures next to the large herbivore exclosures were constructed. The rabbit exclosures showed that rabbits were impacting grasses and forbs in certain plots. The addition of rabbit exclosures added a dimension to the experiment that was originally

not included. This research will provide important information regarding the impacts that high density rabbit populations have on forage production. In 2003 data was collected and will continue to be collected through 2004.

In October 2001, four 100 acre plots were treated using the Dixie harrow. Another four 100 acre plots were treated with the Lawson aerator. Vegetation in these plots seems to be responding favorably to the treatments in comparison to the controls. Both grouse counts (using bird dogs) and pellet counts were higher in the treatment areas as compared to controls.

2003 RESEARCH ACTIVITIES

Sage-grouse Hen Captures

The last week of March 2003, 15 hens were trapped and fitted with radio-collars. We trapped six birds around the Black Point lek. Five of the six hens captured on Black Point died before nesting season. The other ten hens were captured in close proximity to the Bull Roost lek. One hen captured at Bull Roost died before nesting season.

Sage-grouse Lek Counts

Lek counts began March 21 and continued through April. The lek counts for the largest leks (Bull Roost and Black Point) were higher than 2002, but slightly down from previous years. Black Point had a high count of 75 males and Bull Roost a high count of 143. Overall, lek counts decreased (29%) from 652 in 2002 to 461 in 2003. Inclement weather during counts (which impacts male attendance), survey methodology imprecision, and natural fluctuation in populations could account for the lower count.

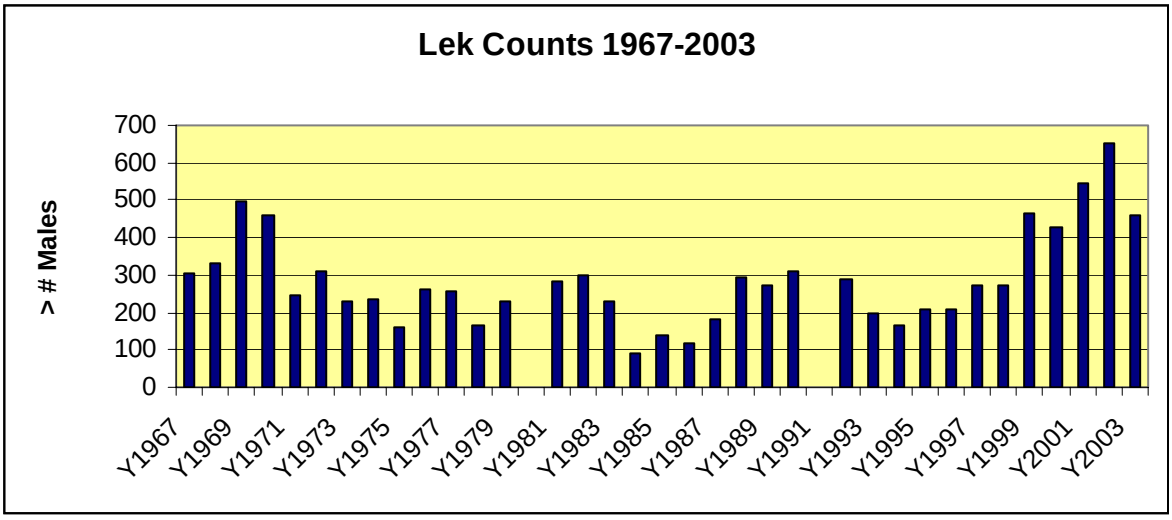


Figure 1. Historical lek counts trends of the Parker Mountain Sage-grouse Population

Monitoring Parker Mountain Sage-grouse Hens

In mid-May 19 sage-grouse hens were monitored to determine their seasonal habitat use patterns. Researchers identified and described the habitats used for nesting and brood-rearing. Researchers also determined nesting success, and chick and adult hen survival rates.

Nesting Activity

The radio-collared hens began nesting (incubation, ~28 days) throughout May. This was almost two weeks later than for 2002. During May, 18 of the 19 collared hens (95%) had established nests. One hen could not be located during this time, but was found later without a nest. She may have initiated then lost her nest, but field personnel were not able to locate her during the early nesting period. Seven of the 18 nests were depredated (39%). This is higher than 2002, and the highest depredation rate since the beginning of the study in 1998. Two nests were abandoned (11%). One abandoning event was possibly due to observer disturbance, while the other cause is unknown. Of the seven

depredated nests, three (43%) were destroyed by avian predators (ravens), and 4 (57%) were mammalian. Nine (50%) remaining nests successfully hatched chicks. The average clutch size was five-six eggs/nest.

Brood-rearing activity

Two hens suffered mortality during brood rearing activities. One died within one or two days after hatching. The other was killed when her chicks were approximately 3 ½ weeks old. Another hen seemed to have lost her brood during hatching, because some eggs had hatched and others had not. The remaining six hens all had chicks throughout the summer. Therefore, those hens that hatched and stayed alive during brood rearing all raised broods. Therefore brood survival is considered relatively high this year.

During the summer the hens with broods and hens without broods generally moved in a southerly or southeasterly direction on Parker Mountain. This direction coincided with an elevation gain (as has been documented the previous 5 years). Distances traveled by hens after nesting varied.

Status of Adult Hens

In 2002 most collared hen mortality occurred prior to nesting activities. Six hens died before May. Three died during the rest of the summer. This is a mortality rate of 36%. The fall radio-telemetry flight to assess hen status did not have much success in locating collared hens. Researchers had a difficult time picking up signals. Flights by the Utah Division of Wildlife Resources (UDWR) will continue in the future to monitor hen locations and mortalities.

Parker Lake Experimental Pasture

Based on work conducted by Joel Flory, the Parker Lake Pasture was selected by the Parker Mountain Adaptive Resource Management (PARM) working group in early 2000

as the experimental pasture to evaluate the effect of several sagebrush management treatments on sage-grouse and vegetation diversity. Three sagebrush management treatments have been implemented on the pasture to evaluate the effect of the treatments on reducing sagebrush canopy cover and vegetation diversity.

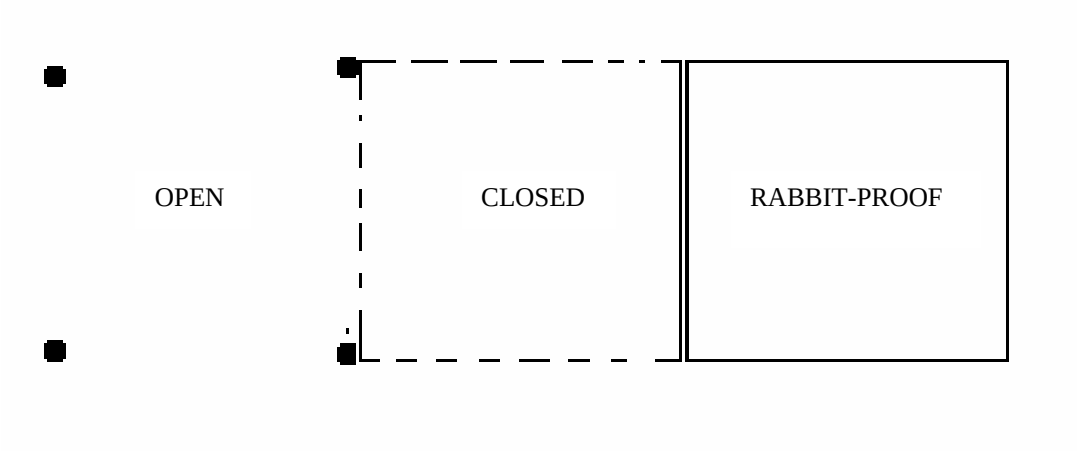
In the spring of 2000, 18 plots were mapped across the landscape encompassing the largest, thickest stands of big mountain sagebrush (*A. tridentata* ssp. *vaseyana*). During the fall of 2000, four plots were aerially treated with tebuthiuron (Spike) at three-tenths pound/acre. The other Lawson aerator treatments and Dixie harrow treatments were delayed due to early snowfall on the site. The remaining plots were treated in October 2001. Four of the plots were Dixie harrowed and four were treated with the Lawson aerator. The aerator was provided by the UDWR. The sites that were harrowed were reseeded with a specially designed seed mixture provided by the Utah Division of Wildlife Resources (UDWR).

During the summer of 2003, to stay consistent with the past three years, three types of vegetation sampling in the experimental plots (Control, Dixie Harrow, Lawson Aerator, and Tebuthiuron) were conducted. Researchers conducted the point-intercept sampling and line-intercept sampling from GPS locations identified and used in the three previous years. From these points, a 20-meter tape was stretched out in the random direction chosen in 2000. The point-intercept sampling was conducted at each meter and the basal cover type recorded. This method was supplemented with a Daubenmire frame at every four meters to "double sample" and compare results. The line-intercept sampling was conducted to measure the canopy cover of the shrubs. Both of these methods were conducted in June and July, corresponding to early and late brood-rearing periods of time on Parker Mountain.

To measure the lagomorph utilization of the herbaceous understory vegetation, rabbit-proof exclosures were constructed in 2002 (Figure 3). Researchers sampled the squares (open, closed to large ungulates, closed to large ungulates and lagomorphs) in the same way done in 2001 and 2002. Basal percent cover was estimated with the Daubenmire

frames (n=12) on a grid within each square. The vegetation in the exclosures was sampled once/month from June to September.

Figure 2. Exclosure sampling pattern: Open to everything, closed to large ungulates, closed to large ungulates and lagomorphs.



Experimental Treatments

Tebuthiuron (Spike)

In tebuthiuron treatments there was no measurable response from the understory the first year post-treatment. In the second year post-treatment, the grasses did not respond, but the forbs in the tebuthiuron plots showed a significant response. Considering the extremely dry conditions of 2002, the forb response is particularly unexpected. The availability of forbs during such a dry year provides the broods a nutritional source that might not have been available without the treatment. This may provide a valuable

management tool to specifically improve sage-grouse brood habitat. In 2003 the herbaceous response was apparent compared to controls (Figures 3 and 4).

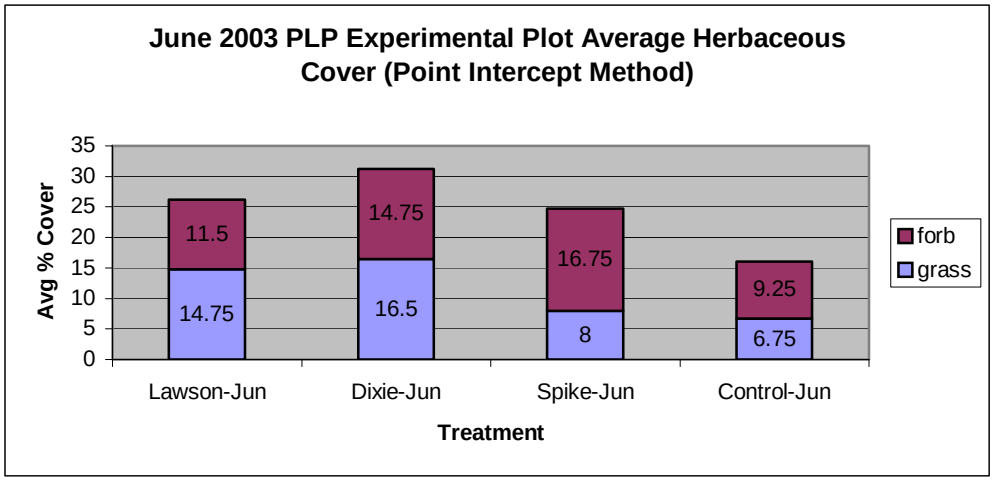


Figure 3. June 2003 herbaceous response in treatments was higher than controls.

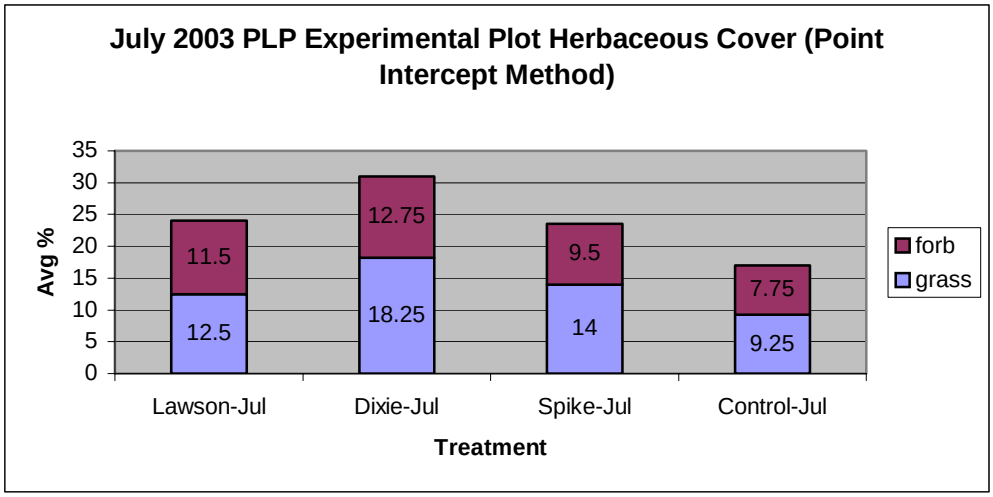


Figure 4. July 2003 herbaceous response in treatments was still higher than controls.

Dixie Harrow

The Dixie Harrow treatment was completed in October 2001. In June and July 2002, researchers collected the first year post-treatment data using the point-intercept sampling technique. Due to the extremely dry year, there appeared to be little understory growth in any of the plots (control or treatment). In 2002, the Dixie Harrow plots did show a higher percentage of herbaceous understory than the control plots, particularly in July. In June and July 2003, Dixie harrow plots showed the most overall herbaceous response (Figures 3 and 4). Dixie plots were the second most preferred plots by grouse as determined from surveys (Figures 5, 6, and 7). Dixie harrow plots were seeded during treatment activities. Very few if any of the seed remained viable till 2003. This was most likely due to the extremely dry summer in 2002. Vegetation data and sage-grouse use data will continue to be collected in 2004.

Lawson Aerator

The Lawson aerator treatment was completed in October 2001. In June and July 2002 researchers took the first series of post treatment data using the point-intercept sampling technique. In 2002, the Lawson aerator understory did increase from June to July despite the dry conditions. The increase was significant in comparison to the decrease in understory within the control areas. In June and July 2003, Lawson plots showed overall herbaceous response to tebuthiuron plots (Figures 3 and 4). Of all treatment types, Lawson showed the least selection by sage-grouse during 2003 as determined by surveys. They were still preferred to control plots (Figures 5, 6, and 7). Vegetation data and sage-grouse use data will continue to be taken in 2004.

Sage-grouse Use

In 2003 data was gathered on sage-grouse use within the experimental plots. To assess use two surveys were conducted. In July and August researchers used birddogs to flush grouse within the plots. To avoid negative impacts bird dog counts were not started until

after observed chicks of both collared and uncollared birds had full flight capability. At the end of the field season (August) researchers conducted sage-grouse pellet counts in the experimental plots. Three transects/plot were sampled and pellets counted with distance to centerline being recorded.

Sage-grouse use of Parker Lake Pasture showed interesting patterns. Tebuthiuron treated plots had the greatest amount of grouse pellets, highest total flush counts, and highest brood counts when compared to other treatment plots. Tebuthiuron treated plots were particularly high in comparison to controls (Figures 5, 6, and 7). Brood use in tebuthiuron treatments was the highest for all three treatments, and considerably higher than controls (Figure 6). Brood use in other treatments was minimal, with the four broods found in Dixie harrow treatments all in the same plot. Additionally, Dandelion spp. (*Taraxacum* spp.) cover was examined alone in comparison to other treatment plots. Dandelion is a forb used heavily by sage-grouse. Tebuthiuron plots showed the highest response throughout the summer (Figure 8). This type of forb response may be one of the reasons grouse use (and specifically brood use) is so much higher in the tebuthiuron plots. Tebuthiuron plots were treated one growing season earlier than the Dixie or Lawson plots. As stated above, the first year post treatment was particularly wet for tebuthiuron plots, especially compared to Dixie and Lawson's first year post treatment. Also the tebuthiuron plots had higher sagebrush cover, including dead skeletal cover, which may provide protection to broods. This may help in explaining the higher luscious forb component in tebuthiuron plots. Sage-grouse use data will continue to be collected in 2004 to examine this trend.

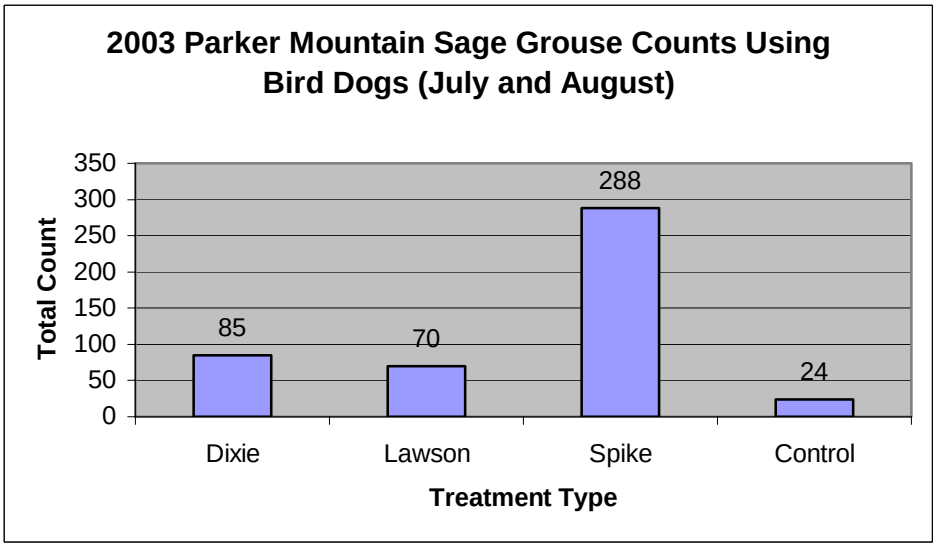


Figure 5. Total flush counts for 2003. Spike had more than the other three plots combined.

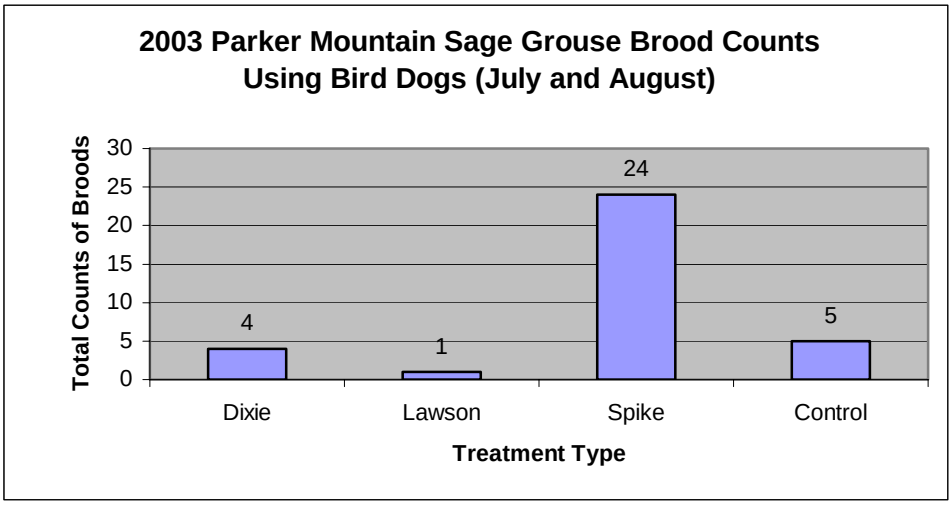


Figure 6. Brood counts for experimental plots in 2003, where spike had the most broods.

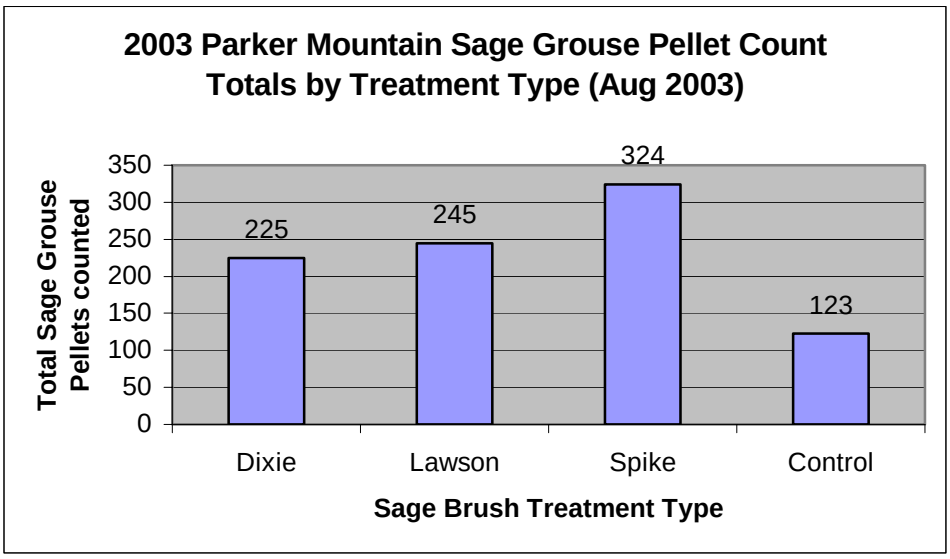


Figure 7. 2003 pellet count data by treatment showed spike with the highest overall count.

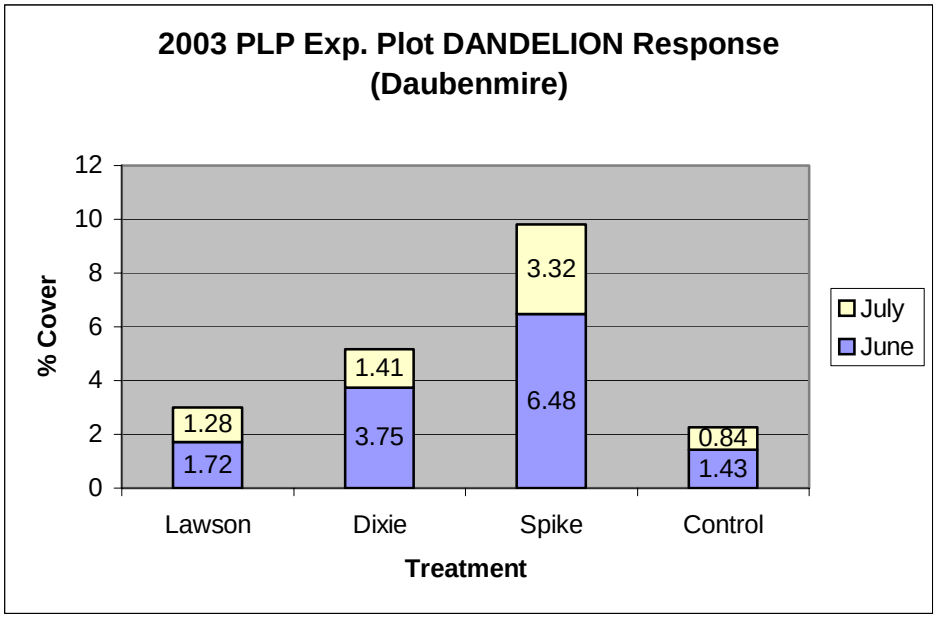


Figure 8. Dandelion cover showed the highest response in tebuthiuron (spike) treated plots.

Rabbit Exclosures

The rabbit exclosures showed some interesting results in 2002. Herbaceous understory abundance data collected from June to September suggests rabbits may be having an impact on forage production in the treatment area. September seems to be the period when rabbit herbivory is most significant.

In 2003 data was taken within the exclosures in the same way as 2002. Data will continue to be collected by Utah State University researchers through 2004. Rabbit transects were run each month during the summer to assess rabbit population trend within Parker Lake Pasture. Data will be compiled following 2004 field season. Researchers look forward to the results of this part of the project as preliminary data has suggested some interesting trends thus far.

Sage-grouse Transplant to Strawberry Valley

In late March and April 2003 researchers from UDWR, USU, and BYU combined efforts to transplant hen sage-grouse from Parker Mountain to Strawberry Valley in north central Utah. Thirty-five hens were moved within three or four trapping nights. With the exception of one night, birds were transferred immediately from capture site to release site the following morning. Hens were released near the main lek in Strawberry Valley to increase the likelihood of Parker birds inter mingling with Strawberry birds. One hen was killed by an eagle upon release and another bird was injured from the trapping and moving process and died shortly after release. All other birds survived the translocation with minimal mortality through the first season. A few Parker hens even nested that first year following the transplant. All hens were radio-collared and followed through the summer and data will continue to be collected into 2004. The same transplant is scheduled for the spring of 2004.

Evaluating the Effect of Grazing on the Utah Prairie Dog

The effect of grazing by cattle on the plant community in a sagebrush steppe ecosystem which is occupied by several Utah prairie dog (*Cynomys parvidens*) colonies is currently being evaluated. The specific area for this experiment is located on School and Institutional Trust Lands Administration (SITLA) land near the junction of Garfield, Piute, and Wayne counties, and is commonly known as the tanks area (Figure 1).

Fence Construction and Vegetation Monitoring

Nine pastures of equal size (8.1 ha or 20 acres) were constructed in a drainage area located in the tanks area of Parker Mountain (Figure 2). Two 2.500 gallon water tanks were placed on the highest elevation of the pastures and a network of PVC pipe was installed. Each pasture has a smaller water tank (apx. 100 gallons) which is supplied by the 2,500 gallon tanks via pipes.

Three treatment levels are being evaluated. They are current forage utilization (50-60%), 20-30% forage utilization, and 80-90% forage utilization. Each of the pastures had a treatment randomly assigned under an elevational stratification. Pastures one, three, five, six, and nine were classified as ridge sites. Pastures two, four, seven, and eight, were classified as swale sites (Figure 2). The randomization specified that each treatment level must be represented in both site types. This was an attempt to control for slope position.

Two exclosures were constructed in each pasture so that forage utilization can be monitored. Exclosure size is 5 x 5 m. Each pasture was divided into 4 equal quadrants. Within each quadrant, five transects 25 m. in length are randomly located for each vegetation survey period. The beginning point and the direction of the transect are random such that the transect does not cross over a pasture boundary. Vegetation measurements are taken at 5 m. intervals along the transect. At each interval a Daubenmire frame is used to evaluate species present, percentage of ground occupied by

each species, and average species height. Additionally, line intercept is utilized to evaluate shrub abundance along the transects (10 m. only). Vegetation measurement will be taken immediately before treatment, immediately after treatment, and in late summer for three field seasons. Daubenmire frames and line intercept are also being used in each exclosure and paired unexclosed plots to evaluate the effect of grazing intensity and to determine forage utilization in each pasture. Cattle are placed on the pastures simultaneously around June 15 and removed when the assigned forage utilization levels are met. Cattle are being provided by members of the grazing association on Parker Mountain.

Prairie Dog Monitoring

Additionally, at the beginning of the study, the locations of any historic prairie dog burrows and mounds within the experimental pastures were recorded with GPS. Throughout the study any new burrow construction or occupation of historic burrows will be noted and the locations recorded. If sufficient movement within the experimental pastures occurs during the study, researchers will test for differences between treatment levels. Weekly prairie dog counts are also conducted in each pasture for the same purpose.

Management Implications

Once the three years of vegetation data are analyzed, specific interpretation can be made regarding the effect of varying grazing intensities on the Utah prairie dog based on knowledge of habitat requirements. This information should prove useful not only to the wildlife manager interested in prairie dog management, but also to the land manager or rancher in managing livestock in ways that allow coexistence with the prairie dogs. The Utah prairie dog is dependent on many vegetation characteristics which can be maintained with proper grazing management. Thus, the future of this species must involve those on the land after a proper knowledge of the effect of grazing on vegetation in prairie dog range is more clearly understood.

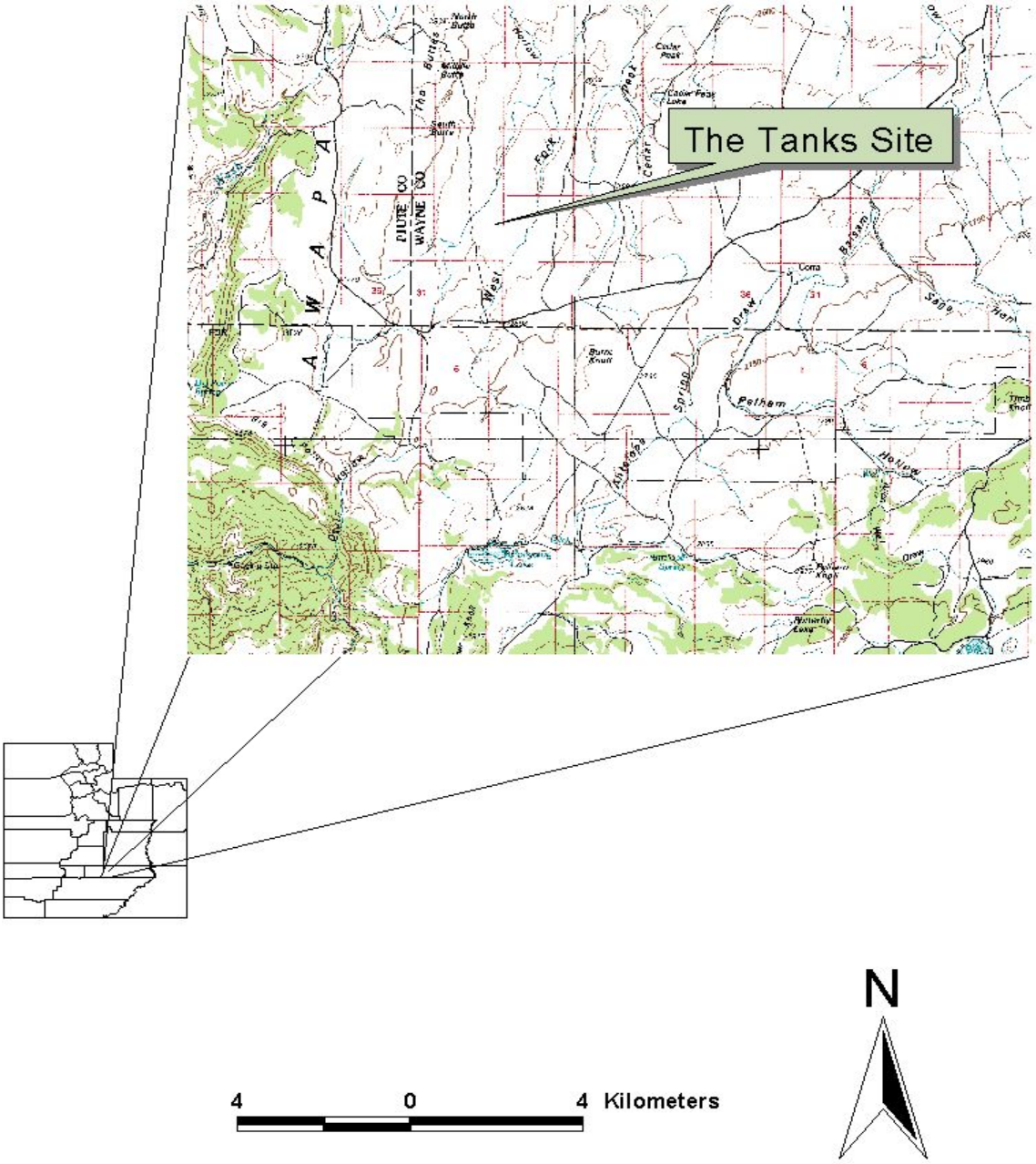


Figure 9. Location of experimental grazing experiment on Parker Mountain, Utah.

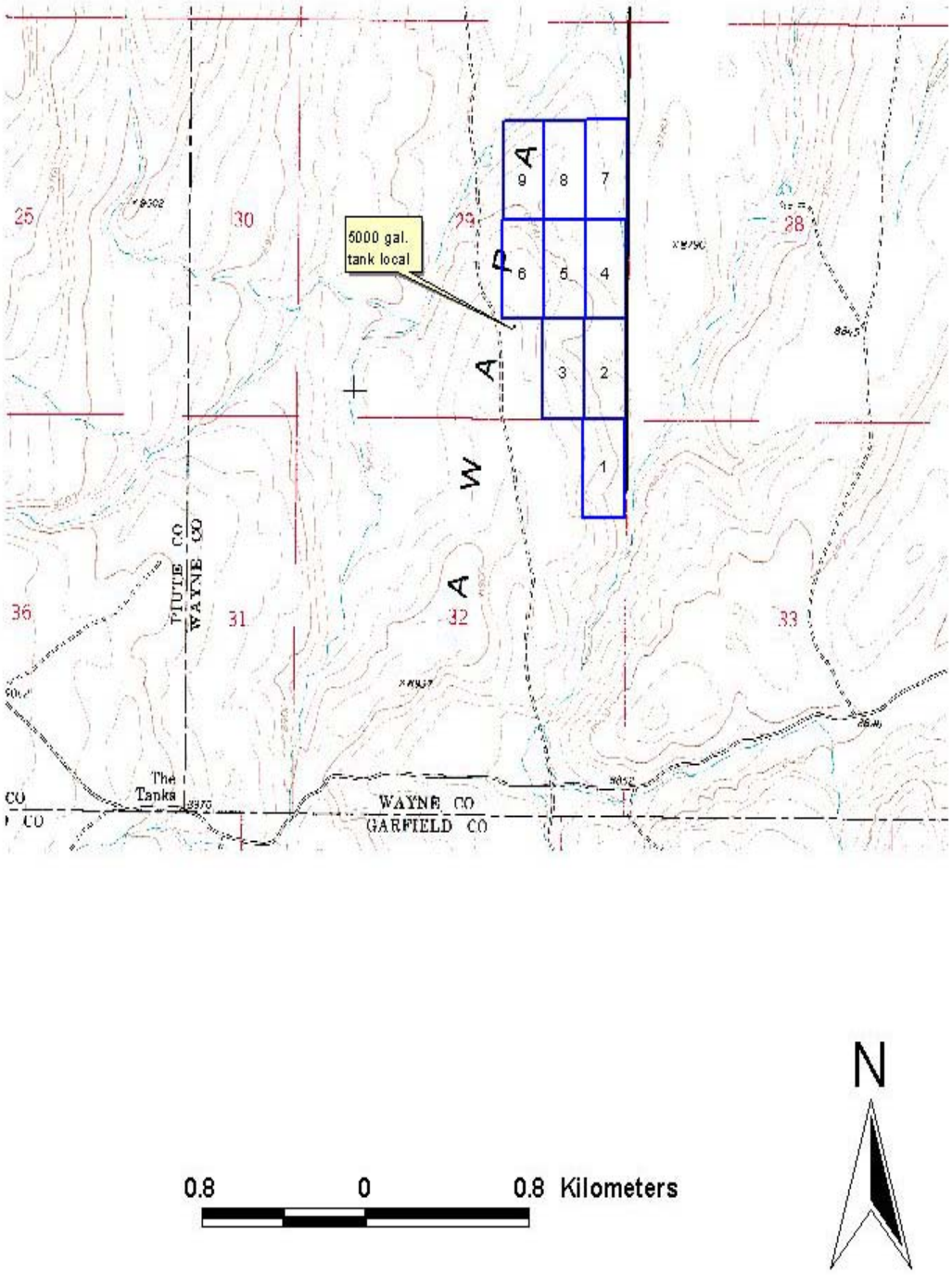


Figure 10. Experimental pasture locations and water tank locations on Parker Mountain, Utah.

Utah Prairie Dog Mitigation Bank

In conjunction with the USFWS Utah prairie dog habitat conservation plan (HCP), the Flossie Knoll site on Parker Mountain was designated as a prairie dog mitigation bank site in 2002. The primary focus of this mitigation bank is to provide a site where Utah prairie dogs involved with incidental take rule in adjacent counties such as Garfield County can be translocated to this area in hopes of increasing population numbers with in Garfield County and on Parker Mountain. The Flossie Knoll site contains several inactive burrows of a reanimate population. Additionally, an active colony exists within four miles of this mitigation site. Prior to treatment in 2002, sagebrush densities exceeded 30 percent in existing stands in this area. This is unsuitable habitat for prairie dogs and treatment of sagebrush in this area was needed to improve habitat conditions for future prairie dog habitation of this site.

Prior to treatments, line intercept and point cover transects were established and photo points were set to monitor changes in sagebrush densities and track changes in vegetative cover and diversity. In October/November 2002, the Flossie Knoll site was fenced followed by Dixie harrow treatments where sagebrush stands were treated and seeded within the site. Brush piles were burned in 2002 and re-seeded in 2003. Throughout 2003, the site was monitored at random for prairie dog use, none were observed and no prairie dogs were translocated to the site. The site will continue to be monitored in 2004 to determine the success/failure of seeding efforts and use by prairie dogs. The site may need to be treated and seeded again, if unsuccessful.

Conclusions

The Sage-grouse population on Parker Mountain appears to have natural fluctuation. This year there was a slight decrease in lek counts, although lek count numbers were relatively high in comparison to historical lek counts. Greater population increases in subsequent years should be expected in response to the vegetation treatments in Parker Lake Pasture and other treatments that will be implemented in subsequent years. Our measurements of sage-grouse use are important monitoring activities. For the second year post treatment, sage-grouse seem to prefer

treated plots over control plots. The vegetation community and structure will continue to change following treatment. Sage-grouse use patterns within these plots will be interesting to monitor. The sample of marked hens had the highest recorded nesting initiation percentage (95%) ever recorded on Parker Mountain. Nest initiation dates for this year were slightly later than last year. Nest predation was fairly significant this year, and nest abandonment was as high as last year and higher than previous years. The average clutch size (five-six eggs/nest) was the same as 2002 and lower than previous years (six-seven eggs/nest). This decrease in average clutch size may be due to the dry spring and low pre-nesting availability of grasses and forbs for the hens. Nest success was 50%, slightly lower than last year (53%). Hen movement was similar to previous years, discounting last year. Hens moved up in elevation much later than last year but similar to previous years.

The response of the sagebrush to the tebuthiuron treatments was significant, specifically for more succulent forbs like dandelion. The forb response to tebuthiuron recorded in the Parker Lake pasture is particularly significant. Additionally, the forage value of these forbs to the sage-grouse broods is critical, especially in dryer years.

Sage-grouse use patterns this year were interesting. Along with analyzing vegetation diversity, documenting sage-grouse use post treatment will be important to assessing treatment effectiveness. During the second year for Dixie and Lawson post treatment, and the third year for tebuthiuron post treatment, grouse seem to prefer the tebuthiuron treated areas. Timing, precipitation, and other factors may be contributing to habitat selection by sage-grouse. Future data will help in assessing sage-grouse use preferences.

According to data taken, rabbit herbivory seems to impact vegetation response to treatments. The data collected in Parker Lake Pasture will be important to understanding plant/herbivore interaction, specifically rabbits and herbaceous understory in sagebrush ecosystems. Data will continue to be taken through 2004.

Summary of Biological Information

I. Lek Counts

1998	>273 males
1999	>350 males, up>25%
2000	>350 males, still up but down slightly from 1999
2001	>450 males, up ~20% from last year…highest count in 30 years
2002	>550 males, up ~15% from 2001…still highest count in 30 yrs
2003	>413 males, down 25% from 2002

II. Nest Initiation

	Y	A	
1998	8/19	8/9	(57%)
1999	6/16	16/17	(67%)
2000	* 13/26		(50%)
2001	* 17/25		(68%)
2002	* 19/26		(79%)
2003	* 18/19		(95%)

* Denotes combined yearling and adult data

III. Nest Predation

1998	3/16	(19%)
1999	10/19	(53%)
2000	2/13	(15%)
2001	6/17	(35%)
2002	5/19	(25%)
2003	7/18	(39%)

IV. Adult Mortality

2000	6/21	(28%) (*by the end of August, only 21 collars were still transmitting)
2001	6/25	(24%)
2002	9/26	(35%)
2003	9/25	(36%)